Unpacked South Dakota State Mathematics Standards

Purpose: *In order for students to have the best chance of success, standards, assessment, curriculum resources, and instruction must be aligned in focus, coherence, and rigor. Unpacked standards documents are intended to help align instruction to the focus, coherence, and rigor of the South Dakota State Mathematics Standards. The standards have been organized in clusters as they are not so much built from topics, but rather woven out of progressions. Not all content in a given grade is emphasized equally in the mathematics standards. Some clusters require greater emphasis than others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. To say that some things have greater emphasis is not to say that anything in the standards can safely be neglected in instruction. Neglecting standards will leave gaps in student skill and understanding and may leave students unprepared for the challenges of a later grade.*

Domain: Functions	**Grade Level: Algebra 2**
A2.F.TF.B Cluster: Model periodic phenomena with trigonometric functions. *Learners make connections with the unit circle and the graphs of trigonometric functions they construct.*	
****This is a SUPPORTING cluster.** *Students should spend the large majority of their time (65-85%) on the major work of the grade. Supporting work and, where appropriate, additional work should be connected to and engage students in the major work of the grade.* **A2.F.TF.C.5 Choose trigonometric functions (sine and cosine) to model periodic phenomena with specified amplitude, frequency, and midline.** ***(Uses modeling)***	
Aspects of Rigor for Students: (Conceptual, Procedural, and/or Application)	
A2.F.TF.C.5 ***Choose trigonometric functions (sine and cosine) to model periodic phenomena with specified amplitude, frequency, and midline. (Uses modeling)***	

Conceptual Understanding	***Procedural Fluency***	***Application***
	Learners will: ● Identify parts of a trigonometric function (amplitude, period, frequency, and midline). ● graph the function on a coordinate plane.	Learners can model real world situations using sine and/or cosine graphs Examples: Ferris Wheel, pendulum, sunrise/sunset times, etc.

Enacting the Mathematical Practices - Evidence of Students Engaging in the Practices

1. **Make sense of problems and persevere in solving them.**
2. **Reason abstractly and quantitatively.**
3. **Construct viable arguments and critique the reasoning of others.**
4. **Model with mathematics.**
    - Students are able to model real world situations using sinusoidal functions (i.e. Ferris Wheel, Sunrise/Sunset times throughout the year, etc.)
5. **Use appropriate tools strategically.**
6. **Attend to precision.**
7. **Look for and make use of structure.**
    - Students are able to use their knowledge of key features, unit circle, and transformations in order to graph sinusoidal functions.
8. **Look for and express regularity in repeated reasoning.**

Vertical and Horizontal Coherence and Learning Progressions

Previous Learning Connections	***Current Learning Connections***	***Future Learning Connections***
In Algebra 1, students learn about key features of graphs (i.e. intercepts, min/max, domain). *In Geometry students learn about degree/radian measure and trigonometric ratios.*	*Students will extend the knowledge learned in this cluster to the unit circle, transformations, and key features of graphs.*	*In Precalculus and Calculus courses, students will connect this learning cluster to other trigonometric ratios and functions (tangent, cosecant, secant and cotangent) and inverse trigonometric functions.*

Vocabulary (key terms and definitions)

- Amplitude
- Frequency (in terms of trigonometric functions)
- Maxima
- Midline
- Minima
- Period
- Sinusoidal

Relevance, Explanations, and Examples:

Achievement Level Descriptors

Cluster: Model periodic phenomena with trigonometric functions.

Concepts and Procedures	***Level 1:*** Students should be able to apply mathematics to solve familiar problems arising in everyday life, society, and the workplace by identifying important quantities and by beginning to develop a model.
	Level 2: Students should be able to apply mathematics to propose solutions by identifying important quantities, locating missing information from relevant external resources, beginning to construct chains of reasoning to connect with a model, producing partial justification and interpretations, and beginning to state logical assumptions.
	Level 3: Students should be able to apply mathematics to solve unfamiliar problems arising in everyday life, society, and the workplace by identifying important quantities and mapping, displaying, explaining, or applying their relationship and by locating missing information from relevant external resources. They should be able to construct chains of reasoning to justify a model used, produce justification of interpretations, state logical assumptions, and compare and contrast multiple plausible solutions.
	Level 4: students should be able to apply mathematics to solve unfamiliar problems by constructing chains of reasoning to analyze a model, producing and analyzing justification of interpretations, stating logical assumptions, and constructing and comparing/contrasting multiple plausible solutions and approaches.